packet one of Y associated levels of priority, wherein each level of priority is associated with a different probability of packet loss;

D. a buffer subsystem for retaining the packets in class of service per output port queues based on probabilities of discard associated with the X * Y classes of service; and

E. a scheduler for transferring the packets from the buffer through each of the output ports based on the X classes of service.

31. The router of claim 30 wherein the buffer subsystem includes multiple storage locations and links available storage locations in a free queue.

32. The router of claim 31 wherein the buffer subsystem includes a processor that determines:

i. a new weighted average depth for the free queue, and

ii. a probability of discard for a given packet if the new weighted average queue depth falls below a predetermined maximum threshold associated with the class of service to which the packet is assigned by the classifier.

33. The router of claim 32 wherein the buffer subsystem discards a given packet if the associated new weighted average depth for the free queue falls below a minimum threshold associated with the class of service to which the packet is assigned.

34. The router of claim 33 wherein the buffer subsystem processor calculates the probability of discard as $P_d = c-(m*A_{NEW})$ where c is an intercept and m is a slope that is associated with a line that plots average free queue depth versus probability of discard for the class of service to which the packet is assigned, and A_{NEW} is the new weighted average depth of the free queue.

35. The router of claim 34 wherein the buffer subsystem processor calculates the new weighted average depth of the free queue as $A_{NEW} = A_{CURRENT} + w(I-A_{CURRENT})$ where w

is a weighting factor, I represents the instantaneous depth of the free queue and $A_{CURRENT}$ is the current weighted average depth of the free queue.

36. The router of claim 35 wherein the scheduler selects from the buffer subsystem packets for transfer based on weighting factors associated with the respective 2^n classes of service.

37. A router for use in routing packets over a network, the router supporting a plurality, X, of classes of service and including:

A. a plurality of input ports for receiving packets over the network;

B. a plurality of output ports for transferring packets over the network;

C. a multiple storage location buffer for retaining packets to be transferred through the output ports;

D. a buffer subsystem for retaining the packets in class of service per output port queues based on probabilities of discard associated with X*Y classes of service, where * represents multiplication; and

E. a scheduler for transferring the packets from the buffer subsystem through each of the output ports based on the X classes of service that the router supports.

38. The router of claim 37 further including a classifier for:

i. assigning packets received by the input ports to X*Y classes of service,

ii. associating the packets with the X*Y classes of service that are supported by the router, and

iii. assigning to the packet one of X*Y associated levels of priority, wherein each level of priority is associated with a different probability of packet loss.

39. The router of claim 38 wherein the buffer subsystem includes a processor that determines

i. a new weighted average queue depth for a free queue that links available buffer storage locations, and

ii. a probability of discard for a given packet if the new weighted average free queue depth falls below a predetermined maximum threshold associated with the class of service to which the packet is assigned.

40. The router of claim 39 wherein the buffer subsystem processor calculates the probability of discard as $P_d = c-(m*A_{NEW})$ where c is an intercept and m is a slope that are associated with a line that plots average free queue depth versus probability of discard for the class of service to which the packet is assigned, and A_{NEW} is the new weighted average depth of the free queue.

41. The router of claim 40 wherein the buffer subsystem processor calculates the new depth of the weighted average free queue as $A_{NEW} = A_{CURRENT} + w\ (I-A_{CURRENT})$ where w is a weighting factor, I represents the instantaneous depth of the free queue and $A_{CURRENT}$ is the current weighted average depth of the free queue.

42. The router of claim 41 wherein the buffer subsystem discards a given packet if the new weighted average free queue depth falls below a minimum threshold associated with the class of service to which the packet is assigned.

43. The router of claim 41 wherein the buffer subsystem retains a given packet if the new weighted average free queue depth is above a maximum threshold associated with the class of service to which the packet is assigned.

44. The router of claim 37 wherein the scheduler selects packets for transfer through each output port based on weighting factors associated with the respective 2^n classes of service.